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# APPENDIX I

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## MOTOR VEHICLE SEAT

### BACKGROUND AND SUMMARY OF THE INVENTION

[0001] This invention relates to a vehicle seat for a motor vehicle.

[0002] In a known vehicle seat for an open motor vehicle or convertible (see German document DE 100 47 754 A1), to avoid an undesirable draft for the seat user, air discharge openings are provided level with the upper region of the backrest, which air discharge openings are connected to an air-distributing device integrated in the backrest. The air-distributing device has a fan and a heating element for heating the air flow. Of the air discharge openings, one is arranged in the upper side of the backrest and two are arranged in the lateral narrow sides of the backrest. The air discharge openings are oriented in such a manner that the air flow is discharged essentially in the transverse direction of the vehicle. To avoid eddies of cold air when traveling with the motor vehicle open, a wind deflector is integrated in the backrest, is designed, for example, as a roller blind, and can be extended out of the backrest or retracted into the backrest manually or by motor. In the extended position, the upper edge of the wind deflector is fixed to the rear side of the head cushion. In this case, the wind deflector extends over the entire width of the backrest and tapers toward the head cushion.

[0003] In another vehicle seat which is likewise known (see German document DE 101 60 799 A1) and which has an additional heating system for the head, neck and shoulder region of the seat user by means of hot air being blown out, a pressure connection of a hot air fan ends with its blow-out opening in the intermediate space between the head cushion and the upper side of the backrest. The normal of the blow-out opening of the pressure connection is oriented approximately horizontally, so that the head, neck and shoulder region of the seat user has hot air flowing directly against it.

[0004] One object of the invention is the object of more effectively designing the ventilation device for supplying hot air to the head, neck and shoulder region of the seat user so that, while any flow noises are negligible, the seat user experiences a comfortable sensation of heat without there being any draft.

[0005] This object is achieved according to the invention.

[0006] The vehicle seat according to the invention has the advantage that, by means of a diffuser present in the intermediate space between backrest and head cushion, the hot air blow-out opening, which is enclosed in the upper side of the backrest and is advantageously not directly visible, does not issue a directed and focused hot air stream which directly impacts against the neck and head and shoulder region of the seat user or flows past that region at a great flow rate.

Rather, the opening issues a diffuse, fanned-out, gentle hot air flow which acts upon the neck and head region of the seat user and, as a result, in this region forms a type of hot air cushion which initiates a comfortable sensation of heat for the seat user. Owing to the fact that the diffuser covers the intermediate space between backrest and head cushion to the rear, the formation of the hot air cushion cannot be disturbed from the rear by horizontal air flows. By the length-variable diffuser being fixed to the head cushion and to the upper side of the backrest, this hot air cushion is produced and maintained irrespective of the size of the seat user and the head restraint height setting, which is dependent on seat user size. Advantageous embodiments of the vehicle seat according to the invention together with expedient developments and refinements of the invention are defined by the further patent claims.

[0007] According to a preferred embodiment of the invention, in the transverse direction of the seat, the diffuser covers the region between the two supporting rods of the head restraint. This affords the advantage that the view of the seat user, in particular of the driver, to the rear is not restricted, without compromises having to be made with regard to the hot air cushion produced in the head, neck and shoulder region of the seat user.

[0008] The invention is described in more detail below with reference to exemplary embodiments illustrated in the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] Figure 1 shows part of a side view of a vehicle seat, occupied by a seat user, with backrest, head restraint and hot-air ventilation device,

[0010] Figure 2 shows part of a front view of the backrest with the head restraint in Figure 1 without the seat user,

[0011] Figure 3 shows an identical illustration as in Figure 1 with a modified diffuser of the hot-air ventilation device,

[0012] Figure 4 shows an identical illustration as in Figure 1 with a diffuser according to a further exemplary embodiment,

[0013] Figure 5 shows a section along the line V-V in Figure 4,

[0014] Figure 6 shows part of a front view of the backrest of a vehicle seat with a hot-air ventilation device according to a further exemplary embodiment, and

[0015] Figure 7 shows a side view of the backrest with the hot-air ventilation device according to Figure 6 with a modified diffuser.

## DETAILED DESCRIPTION OF THE INVENTION

[0016] The vehicle seat, part of which is illustrated in side view in Figure 1 and in plan view in Figure 2, has a backrest 11, a height-adjustable head restraint 12 and a ventilation device 13 which is integrated in the backrest 11 and by means of which the head and neck region and also partially the shoulder region of a seat user 10 sitting on the vehicle seat is acted upon with hot air. The head restraint 12 has in a known manner a U-shaped supporting hoop 14 with two parallel supporting rods 141 to the transverse part of which, which connects the two supporting rods 141, a head cushion 15 is fastened. The supporting rods 141 are guided in a known manner in the backrest 11 such that they can be displaced axially, so that the head restraint 12 can be set in its setting height, i.e. the distance of its head cushion 15 from the upper side 111 of the backrest 11, in accordance with the size of the seat user 10.

[0017] In order to blow out the hot air of the ventilation device 13, a blow-out opening 16 is embedded in the upper side 111 of the backrest 11 and is the mouth opening of a pressure connection 17 of a suction fan 18 of the ventilation device 13, which suction fan is integrated in the backrest 11. In a manner not illustrated further, the suction fan 18 sucks up hot air and blows it out via the pressure connection 17 and the blow-out opening 16. Alternatively, the suction fan 18 can suck up ambient air from the interior of the vehicle, with the air being guided over an electric heating element. The discharge direction of the hot air from the blow-out opening 16 is directed toward the head cushion 15.

[0018] In order to achieve an effective circulation of hot air around the head, neck and shoulder region of the seat user 10, a diffuser 19 is arranged in the intermediate space between the upper side 111 of the backrest 11 and the lower side 151 of the head cushion 15 in such a manner that it covers the intermediate space to the rear from an airflow. In the transverse direction of the seat, the diffuser 19 here fills the region between the two supporting rods 141 of the supporting hoop 14 of the head restraint 12. The diffuser 19 is designed in such a manner and oriented relative to the blow-out opening 16 in the upper side 111 of the backrest 11 in such a manner that it alters the focused hot air stream, which emerges from the blow-out opening 16 and is directed toward the head cushion 15, into a wide, diffuse hot air flow with a low flow rate aiming at the neck and head region of the seat user 10. In the exemplary embodiment of Figures 1 and 2, the diffuser 19 is formed by a stretched cloth 20 which is inclined at an acute angle to the upper side 111 of the backrest 11 and extends from the rear edge of the upper side 111 of the backrest 11 as far as the front edge of the lower side 151 of the head cushion 15. The cloth 20 is pulled off in the manner of a roller blind from a reel of cloth wound up on a pretensioned, resetting roller-blind-type rod 21. When the head restraint 12 is adjusted in height, the cloth 20 is pulled off from the reel of cloth to a greater or lesser extent and always remains tensioned tautly approximately in the inclination, shown in Figure 1, with respect to the blow-out opening 16 in the upper side 111 of the backrest 11. In Figure 1, air flow arrows 22 symbolize the manner in which the

hot air stream being discharged from the blow-out opening 16 in the direction of the head cushion 15 is altered by the cloth 20 into a wide, diffuse hot air flow directed at the neck and head region 12 of the seat user 10.

[0019] In the case of the vehicle seat which is partially illustrated in Figure 3 and is occupied by a seat user 10, the diffuser 19 is designed as a pleated cloth 23 which can be expanded in the manner of a concertina and, like the cloth 20 in Figures 1 and 2, is fastened to the rear edge of the upper side 111 of the backrest 11 and to the front edge of the lower side 151 of the head cushion 15, with the folds of the pleated cloth 23 running in the transverse direction of the seat. The pleated cloth 23, which, as a result, is likewise inclined toward the upper side 111 of the backrest 11, again extends in the transverse direction of the seat between the supporting rods 141 of the supporting hoops 14 of the head restraint 12. A height adjustment of the head restraint 12 is compensated for by a reduction or an enlargement of the height of the folds in the pleated cloth 23, so that the pleated cloth 23 always remains tensioned.

[0020] In the exemplary embodiment, illustrated in Figure 4, of the vehicle seat, the diffuser 19 is formed by an expansion bellows 24 which surrounds the two supporting rods 26 and is fastened on the upper side 111 of the backrest 11 and to the lower side 151 of the head cushion 15. As the sectional illustration in Figure 5 shows, the expansion bellows 24 is open continuously longitudinally in its front region pointing to the neck and rear of the head of the seat user 10, so



that the hot air flowing out of the blow-out opening 16 into the expansion bellows 24, after being deflected and scattered against the walls of the expansion bellows, emerges from the expansion bellows 24 in a diffuse manner on the front side of the expansion bellows 24, which side is directed toward the seat user 10.

[0021] In the case of the exemplary embodiment of the vehicle seat in Figure 6, the diffuser 19 is formed by a blow-out duct 25 which surrounds the blow-out opening 16, enters the backrest 11 and can be displaced axially there in the manner of a telescope on the pressure connection 17 of the suction fan 18 of the ventilation device 13. The blow-out duct 25 is fastened to the lower side 151 of the head cushion 15, so that it is carried along during a height adjustment of the head restraint 12 and is displaced on the pressure connection 17 of the suction fan 18. The duct section 251 of the blow-out duct 25, which duct section extends between the upper side 111 of the backrest 11 and the lower side 151 of the head cushion 15, covers, in the transverse direction of the seat, the intermediate space between the two supporting rods 141 of the head restraint 12 to the rear and is open on its front side pointing to the neck and head region of the seat user 10, so that the hot air again acts in the desired manner upon the neck and head region of the seat user 10.

[0022] In the exemplary embodiment illustrated in Figure 7, the duct section 251 of the blow-out duct 25 is additionally curved forward, thus assisting the deflection of the hot air flow. In addition, it is indicated by chain-dotted lines

that this embodiment of the ventilation device is suitable with a diffuser 19, designed as a blow-out duct 25, for backrests 11 with an integrated head restraint 12, in which an end portion 26 of the backrest is pulled up behind the height-adjustable head restraint 12.